Water

Device Description: _____

Contact Name: _____ Phone: _____

Company: _____ Address: _____

E-mail: _____ City: _____

Instructions For Completing Pre-Evaluation Checklists

You will usually need to complete **both** the "General" checklist and the specific checklist which is most applicable to your device or system type. For example, for a weighing device or weighing system the "General" checklist (which applies to all device types) and the "Scales" checklist should be completed. Both the "General" and "Watthour Meter" checklists should be completed and submitted with an electric watthour metering system application.

The exceptions are the computer software/hardware component pre-evaluation checklists which have the "General" requirements incorporated in them. Use the checklist for computer systems connected with either scales or measuring systems. Only one pre-evaluation checklist will be needed unless the software will be connected to both types of systems

These checklists include requirements extracted from the California Code of Regulations. Though not all-encompassing, the checklists contain requirements beyond those which would apply to any single device type or accessory. It is best to think of a device type as a weighing or measuring device system or as a component of such a system whichever best describes the device(s).

When applying the requirements to your device you have three options; Check

YES If your device or system complies
NO if the device or system does not comply.
NA if sections appear not to apply to the device or system type(s)

If selecting "**NO**", consider if your device or system is ready for evaluation. If the deficiency is of such a nature that it will not effect the ability to test for accuracy, such as failure to conform with marking requirements or lack of provision for sealing, the evaluation can probably begin while deficiencies are being corrected.

If you are not able to conduct accuracy testing your system or device is probably not yet ready for an evaluation.

I have reviewed the enclosed specifications, tolerances, and test notes for the device type for which we have applied for evaluation and approval. To the best of my knowledge I have determined the device meets all applicable requirements.

Signed: _____ Date: _____

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A. Application.

A.1. This code applies to devices used for the measurement of water; generally applicable to, but not limited to, utilities type meters installed in residences or business establishments and meters installed in batching systems.

A.2. This code does not apply to:

(a) water meters mounted on vehicle tanks.
(b) mass flow meters.

	Yes	No	NA
S. Specifications. **S.1. Design of Indicating and Recording Elements and of Recorded Representations.** **S.1.1. Primary Elements.** **S.1.1.1. General.** - A water meter shall be equipped with a primary indicating element and may also be equipped with a primary recording element. Such elements shall be visible at the point of measurement or be stored in non-volatile and nonresettable memory. The display may be remotely located provided it is readily accessible to the customer.			
S.1.1.2. Units. - A water meter shall indicate and record, if the device is equipped to record, its deliveries in terms of liters, gallons or cubic feet or binary or decimal subdivisions thereof except batch plant meters, which shall indicate deliveries in terms of liters, gallons or decimal subdivisions of the liter or gallon only.			
S.1.1.3. Value of Smallest Unit. - The value of the smallest unit of indicated delivery and recorded delivery, if the device is equipped to record, shall not exceed the equivalent of: (a) 50 L (10 gal) on utility type meters, (b) 0.2 L (1/10 gal) on batching meters delivering less than 375 L/min (100 gal/min), or (c) 5 L (1 gal) on batching meters delivering 375 L/min (100 gal/min) or more.			
S.1.1.4. Advancement of Indicating and Recording Elements. - Primary indicating and recording elements shall be susceptible to advancement only by the mechanical operation of the device.			
S.1.1.5. Return to Zero. - If the meter is so designed that the primary indicating elements are readily returnable to a definite zero indication, means shall be provided to prevent the return of these elements beyond their correct zero position.			
S.1.2. Graduations. **S.1.2.1. Length.** - Graduations shall be so varied in length that they may be conveniently read.			
S.1.2.2. Width. - In any series of graduations, the width of a graduation shall in no case be greater than the width of the minimum clear interval between graduations, and the width of main graduations shall be not more than 50 percent greater than the width of subordinate graduations. Graduations shall in no case be less than 0.2 mm (0.008 in) in width.			

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	Yes	No	NA
S.1.2.3. Clear Interval Between Graduations. - The clear interval shall not be less than 1.0 mm (0.04 in). If the graduations are not parallel, the measurement shall be made: (a) along the line of relative movement between the graduations at the end of the indicator, or (b) if the indicator is continuous, at the point of widest separation of the graduations.			
S.1.3. Indicators. **S.1.3.1. Symmetry.** - The index of an indicator shall be symmetrical with respect to the graduations, at least throughout that portion of its length associated with the graduations.			
S.1.3.2. Length. - The index of an indicator shall reach to the finest graduations with which it is used, unless the indicator and the graduations are in the same plane, in which case the distance between the end of the indicator and the ends of the graduations, measured along the line of the graduations, shall be not more than 1.0 mm (0.04 in).			
S.1.3.3. Width. - The width of the index of an indicator in relation to the series of graduations with which it is used shall not be greater than: (a) the width of the widest graduation, and (b) the width of the minimum clear interval between graduations. When the index of an indicator extends along the entire length of a graduation, that portion of the index of the indicator that may be brought into coincidence with the graduation shall be of the same width throughout the length of the index that coincides with the graduation.			
S.1.3.4. Clearance. - The clearance between the index of an indicator and the graduations shall in no case be more than 1.5 mm (0.06 in).			
S.1.3.5. Parallax. - Parallax effects shall be reduced to the practicable minimum.			
S.2. Design of Measuring Elements. **S.2.1. Provision for Sealing.** - Adequate provision shall be made for applying security seals in such a manner that no adjustment or interchange may be made of: (a) any measurement elements, and (b) any adjustable element for controlling delivery rate when such rate tends to affect the accuracy of deliveries. The adjusting mechanism shall be readily accessible for purposes of affixing a security seal.			
S.2.2. Batching Meters Only. **S.2.2.1. Air Elimination.** - Batching meters shall be equipped with an effective air eliminator.			
S.2.2.2. Directional Flow Valves. - Valves intended to prevent reversal of flow shall be automatic in operation.			
S.2.3. Multi-Jeter Meter Identification. – Multi-jet water meters shall be clearly and permanently marked as such on the device or identified on the Certificate of Approval.			

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	Yes	No	NA
N. Notes **N.1. Test Liquid.** - A meter shall be tested with water.			
N.2. Evaporation and Volume Change. - Care shall be exercised to reduce to a minimum, evaporation losses and volume changes resulting from changes to temperature of the test liquid.			
N.3. Test Drafts. - Test drafts should be equal to at least the amount delivered by the device in two minutes and in no case less than the amount delivered by the device in one minute at the actual maximum flow rate developed by the installation. The test drafts shown in Table N.4.1. (see page 5) shall be followed as closely as possible.			
N.4. Testing Procedures. **N.4.1. Normal Tests.** - The normal test of a meter shall be made at the maximum discharge rate developed by the installation. Meters with maximum gallon per minute ratings higher than the values specified in Table N.4.1. (see page 5) may be tested up to the meter rating, with meter indications no less than those shown.			
N.4.1.1. Repeatability Tests. – Tests for repeatability should include a minimum of three consecutive test drafts of approximately the same size and be conducted under controlled conditions where variations in factors, such as temperature, pressure, and flow rate are reduced to the extent that they will not affect the results obtained.			
N.4.2. Special Tests. - Special tests to develop the operating characteristics of meters may be made according to the rates and quantities shown in Table N.4.2. (see page 5).			
N.4.3. Batching Meter Tests. - Tests on batching meters should be conducted at the maximum and intermediate rates only.			
T. Tolerances **T.1. Tolerance Values.** - Maintenance and acceptance tolerances shall be as shown in Table T.1. (see page 6).			
T.1.1. Repeatability. When multiple tests are conducted at approximately the same flow rate, the range of the test results shall not exceed 0.6 percent for tests performed at the normal and intermediate flow rates, and 1.3 percent for tests performed at the minimum flow rate, and each test shall be within the applicable tolerance.			
UR.1.1. Strainer. A filter or strainer shall be provided if it is determined that the water contains excessive amounts of foreign material.			
UR.1.2. Siphon Breaker. An automatic siphon breaker or other effective means shall be installed in the discharge piping at the highest point of outlet, in no case below the top of the meter, to prevent siphoning of the meter and permit rapid drainage of the pipe or hose.			
UR.1.3. Provision for Testing. Acceptable provisions for testing shall be incorporated into all meter systems. Such provisions shall include a two-way valve, or manifold valving, and a pipe or hose installed in the discharge line accessible to the proper positioning of the test measure.			

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Table N.4.1. Flow Rate and Draft Size for Water Meters Normal Tests			
Meter Size (inches)	Rate of Flow (gal/min)	Maximum Rate Meter Indication/Test Draft	
		gal	ft^3
Less than 5/8	8	50	5
5/8	15	50	5
3/4	25	50	5
1	40	100	10
1 1/2	80	300	40
2	120	500	40
3	250	500	50
4	350	1 000	100
6	700	1 000	100

Table N.4.2. Flow Rate and Draft Size for Water Meters Special Tests						
Meter Size (inches)	Intermediate Rate			Minimum Rate		
	Rate of Flow (gal/min)	Meter Indication/Test Draft		Rate of flow (gal/min)	Meter Indication/Test Draft	
		gal	ft^3		gal	ft^3
Less than or equal to 5/8	2	10	1	1/4	5	1
3/4	3	10	1	1/2	5	1
1	4	10	1	3/4	5	1
1 1/2	8	50	5	1 1/2	10	1
2	15	50	5	2	10	1
3	20	50	5	4	10	1
4	40	100	10	7	50	5
6	60	100	10	12	50	5

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Table T.1. Accuracy Classes and Tolerances for Water Meters					
Accuracy Class	Application		Acceptance Tolerance	Maintenance Tolerance	Tolerance for Special Tests Conducted at the Minimum Flow Rate
1.5	Water, Other than Multi-Jet Water Meters	Overregistration	1.5%	1.5%	1.5%
		Underregistration	1.5%	1.5%	5.0%
1.5	Water, Multi-Jet Water Meters	Overregistration	1.5%	1.5%	3.0%
		Underregistration	1.5%	1.5%	3.0%